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Miner's Patent Street Lamps.

This valuable lamp has been previously illustrated in this Journal; but it has been much improved since that time, through the enterprise of The Heath & Smith Manufacturing Company, 44 Murray street, New York, who have the exclusive manufacturing right for the United States.

MINER'S PATENT LAMP FOR STREET, DEPOTS, ETC.

The illustrations shown herewith, give a correct idea to the intelligent reader of the nature and character of this important invention.

It consists briefly, of a single heavy cylinder of glass closed at bottom in form resembling an inverted dome, suspended in an ornamented cover or cupola of galvanized iron, copper, or porcelainized metal. This cover rests upon three small iron supports passing down outside the glass, and secured to the top of the lamp post, as represented in the cuts. The bottom of the inverted dome is sufficiently open to allow the lamp-lighter to introduce his light, and also to open the stop cock.

The cover is hinged to allow the interior of the lamp to be cleaned, and so situated as to reflect the light outwardly and downward, to the best advantage.

Various other new and beautiful styles of these lamps are manufactured, such as brackets, suspension or hall lamps, for depots, public rooms, and the like, as shown in the accompanying cuts.

The shape of the glass, together with its thickness, make it capable of resisting heavy blows, without fracturing. It is protected by the projecting cover or cupola, from the storm, and does not get weather-stained and semi-opaque like the old lamp. It utilizes from 10 to 20 per cent. more light. It is neat, symmetrical, ornamental, and economical.

These lamps are becoming very popular in this country, and deservedly so, and will soon take the place of the ancient nondescript, with its rattling, broken, and weather-stained panes, and flaring or often extinguished light, which is generally a standing sign for repairs an object disagreeable to look upon at any time, but incontinently calling forth the malignant anathema of the storm-benighted wayfarer. The improved Miner lamp is being introduced in London and others parts of Europe, we understand, with great success.

For further particulars please see advertisement in another column, or address, Messrs. Heath & Smith, Manufacturing Company, 44 Murray street, N. Y.

During the week ending February 19, there were received in Philadelphia 3,850 barrels of crude, and 14,870 barrels refined petroleum. The exportations for the same period aggregated 762,152 gallons. At present, one ship, two brigs and eight barks are loading with this oil.

Professor Tyndall "On Dust and Disease."

[*Concluded from page* 85.]

SCHWANN, of Berlin, discovered the yeast plant independently; and in February, 1837, he also announced the important result, that when a decoction of meat is effectually screened from ordinary air, and supplied solely with air which has been raised to a high temperature, putrefaction never sets in. Putrefaction, therefore, he affirmed to be caused by something derived from the air, which something could be destroyed by a sufficient high temperature. The experiments of Schwann were repeated and confirmed by Helmholtz and Ure. But as regards fermentation, the minds of chemists, influenced probably by the great authority of Gay Lussac, who ascribed putrefaction to the action of oxygen, fell back upon the old notion of matter in a state of decay. It was not the living yeast plant, but the dead or dying parts of it, which, assailed by oxygen, produced the fermentation. This notion was finally exploded by Pasteur. He proved that the so-called "ferments" are not such; that the true ferments are organized beings which find in the reputed ferments their necessary food. Side by side with these researches and discoveries, and fortified by them and others, has run the germ theory of epidemic disease. The notion was expressed by Kircher, and favored by Linnæus, that epidemic diseases are due to germs which float in the atmosphere, enter the body, and produce disturbance by the development within the body of parasitic life. While it was still struggling against great odds, this theory found an expounder and defender in the president of this institution.

At a time when most of his medical brethren considered it a wild dream, Sir Henry Holland contended that some form of the germ theory was probably true. The strength of this theory consists in the perfect parallelism of the phenomena of contagious diseases with those of life. As a planted acorn gives birth to an oak competent to produce a whole crop of acorns, each gifted with the power of reproducing its parent tree, and as thus from a single seedling a whole forest may spring, so these epidemic diseases literally plant their seeds, grow, and shake abroad new germs, which, meeting in the human body their proper food and temperature, finally take possession of whole populations. Thus Asiatic cholera, beginning in a small way in the Delta of the Ganges, contrived in seventeen years to spread itself over nearly the whole habitable world. The development from an infinitisimal speck of the virus of small-pox of a crop of pustules, each charged with the original poison, is another illustration. The reappearance of the scourge, as in the case of the Dreadnought at Greenwich, reported on so ably by Dr. Budd and Mr. Busk, receives a satisfactory explanation from the theory which ascribes it to the lingering of germs about the infected place. Surgeons have long known the danger of permitting air to enter an opened abscess. To prevent its entrance they employ a tube called a canula, to which is attached a sharp steel point called a troca. They puncture with the steel point and by gentle pressure they force the pus through the canula. It is necessary to be very careful in cleansing the instrument; and it is difficult to see how it can be cleansed by ordinary methods in air loaded with organic impurities, as we have proved our air to be. The instrument ought, in fact, to be made as hot as its temper will bear. But this is not done, and hence, notwithstanding all the surgeon's care, inflammation often sets in after the first operation, rendering necessary a second and a third. Rapid putrefaction is found to accompany this new inflammation. The pus, moreover, which was sweet at first, and showed no trace of animal life, is now fetid, and swarming with active little organisms called vibrios.

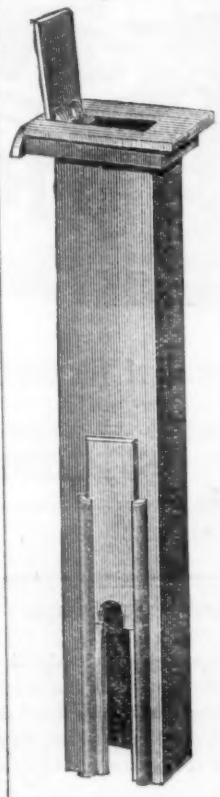
Professor Lister, from whose recent letter this fact is derived, contends, with every show of reason, that this rapid putrefaction and this astounding development of animal life are due to the entry of germs into the abscess during the first operation, and their subsequent nurture and development under favorable conditions of food and temperature. The celebrated physiologist and physicist Helmholz is attacked annually by hay fever. From the 20th of May to the end of June he suffers from a catarrh of the upper air-passages; and he has found during this period, and at no other, that his nasal secretions are peopled by these vibrios. They appear to nestle by preference in the cavities and recesses of the nose, for a strong sneeze is necessary to dislodge them. These statements sound uncomfortable, but by disclosing our enemy they enable us to fight him. When he clearly eyes his quarry, the eagle's strength is doubled, and his swoop is rendered sure. If the germ theory be proved true, it will give a definiteness to our efforts to stamp out disease which they could not previously possess. And it is only by definite effort under its guidance that its truth or falsehood can be established. It is difficult for an outsider like myself to read without sympathetic emotion such papers as those of Dr. Budd, of Bristol, on cholera, scarlet fever, and small-pox. He is a man of strong imagination, and may occasionally take a flight beyond his facts; but without this dynamic heat of heart the stolid inertia of the free-born Briton cannot be overcome. And as long as the heat is employed to warm up the truth without singeing it over much—as long as the enthusiasm can overmatch its mistakes by unequivocal examples of success—so long am I disposed to give it a fair field to work in, and to wish it God speed. But let us return to our dust. It is needless to remark that it cannot be blown away by an ordinary bellows, or, more correctly, the place of the particles blown away is in this case supplied by others ejected from the bellows, so that the track of the beam remains unimpaired; but if the nozzle of a good bellows be filled with cotton wool, not too tightly packed, the air urged through the wool is filtered of its floating matter, and it then forms a clean band of darkness in the illuminated dust. This was the filter used by Schroeder in his experiments on spontaneous generation, and turned subsequently to account in the excellent researches of Pasteur. Since 1868 I have constantly employed it myself. But by far the most interesting and important illustration of this filtering process is furnished by the human breath. I fill my lungs with ordinary air, and breathe through a glass tube across the electric beam. The condensation of the aqueous vapor of the breath is shown by the formation of a luminous white cloud of delicate texture. It is necessary to abolish this cloud, and this may be done by drying the breath previous to its entering the beam; or, still more simply, by warming the glass tube. When this is done the luminous track of the beam is for a time uninterrupted. The breath impresses upon the floating matter a transverse motion, but the dust from the lungs makes good the particles displaced. But after some time an obscure disc appears upon the beam, the darkness of which increases, until finally, towards the end of the expiration, the beam is, as it were, pierced by an intensely black hole, in which no particles whatever can be discerned. The air, in fact, has so lodged its dirt within the lungs as to render the last portions of the expired breath absolutely free from suspended matter. This experiment may be repeated any number of times with the same result. It renders the distribution of the dirt within the lungs as manifest as if the chest were transparent. I now employ my lungs as perfectly as possible, and placing a handful of cotton wool against my mouth and nostrils, inhale through it. There is no difficulty in thus filling the lungs with air. On expiring this air through the glass tube, its freedom from floating matter is at once manifest. From the very beginning of the act of expiration the beam is pierced by a black aperture. The first puff from the lungs abolishes the illuminated dust, and puts a patch of darkness in its place; and the darkness continues throughout the entire course of the expiration. When the tube is placed below the beam and moved to and fro, the same smoke-like appearance as that obtained with a flame is observed. In short, the cotton wool, when used in sufficient quantity, completely intercepts the floating matter on its way to the lungs.

And here we have revealed to us the true philosophy of a practice followed by medical men, perhaps more from instinct than from actual knowledge. In a contagious atmosphere the physician places a handkerchief to his mouth and inhales through it. In doing so he unconsciously holds back the germs of the air. If the poison were a gas it could not be thus intercepted. On showing this experiment with the cotton wool to Dr. Bence Jones, he immediately repeated it with a silk handkerchief. The result was substantially the same, though, as might be expected, the wool is by far the surest filter. The application of these experiments is obvious. If a physician wishes to hold back from the lungs of his patient, or from his own, the germs by which contagious disease is said to be propagated, he will employ a cotton wool respirator. After the revelations of this evening such respirators must, I think, come into general use as a defence against contagion. In the crowded dwellings of the London poor, where the isolation of the sick is difficult, if not impossible, the noxious air around the patient may by this simple means be restored to practical purity. Thus filtered, attendants may breathe the air unharmed. In all probability the protection of the lungs will be the protection of the entire system. For it is exceedingly probable that the germs which lodge in the air-passages, and which, at their leisure, can work their way across the mucous membrane, are those which sow in the body epidemic disease. If this be so, then disease can certainly be warded off by filters of cotton wool. I should be most willing to test their efficacy in my own person; and time will decide whether in lung diseases also the woollen respirator cannot abate irritation, if not arrest decay. By its means, so far as the germs are concerned, the air of the highest Alps may be brought into the chamber of the invalid.

Street Box for Gas Pipes.

The accompanying cuts represent E. McMillin's Street Box for Gas Pipes, patented December 17, 1869.

Fig. 1.



It is superior to other boxes in the following particulars:

First. In its durability and strength; it being made altogether of cast iron.

Second. In the mode of hinging the lid. The hinge being on the underside of the lid, with a box all around it, no dust about the lid or stones

Fig. 2.

beneath it can interfere with its working. It can, therefore, be readily opened with the thumb nail.

Third. In having adjustable slides in opposite sides toward the bottom, so that it can be readily adjusted at once to the service pipe and to the level of the sidewalk.

There are four sizes of this box made, viz., 18 inches, 24 inches, 30 inches, and 36 inches: and the slides are six inches long in all the sizes; so that with the above sizes a box can be adjusted to a service pipe at any depth from 12 inches to 36 inches, both inclusive.

Fig. 1 shows the box in perspective with one slide lifted and the lid raised.

Fig. 2 shows the manner of hinging the lid, whereby the back part of the lid is made to descend, in opening, while the front part ascends.

All orders for this box, addressed to Smith & Ellis, Philadelphia, Pa., or Enos Hill & Co., Gallipolis, Ohio, or the undersigned, will be promptly filled.

Companies desiring the right to make and use it, or individuals desiring the exclusive right to manufacture in certain localities, will be treated with liberally by addressing E. McMillin, Ironton, Ohio.

Petroleum News.

The *Oil City Times* of March 19, says:

The Winsor well, at Red Hot, which was struck some six months since, and for a long time produced two hundred barrels daily, has dwindled down to about sixty barrels per day. Last week it was cleaned out and benzine put into it, and on Friday was pumping at the rate of one hundred and seventy-five barrels per day. The territory in the vicinity of Scrubgrass is improving. A new tract, known as the McMillan farm, is now producing twelve barrels daily. On the Foster farm there have also been new strikes. Near this farm the McDonough Oil Company are putting down a well, which makes a good show.

The *Lawrenceburgh Independent* says the Cliff well on Fowler Run, which was doing only two barrels, was torpedoed on Monday, and is now producing fifteen barrels. The Niagara, on the Wm. Parker tract, below Church Run, which was producing about eighteen barrels, was torpedoed last week, and is now yielding thirty barrels daily. The Williams well, on the river, on land of James Parker, is now through the third sand with a good show.

The *Pleasantville Gaslight* says that five new rigs are up on the Wrigglesworth tract, near the Hawes tract. The Foggin & Coleman well No. 2, on the King farm, is down and ready for testing. New wells are going down on the Sheridan farm, adjoining the Atkinson farm; Shamburg, Fertig & Co, on the Chicago tract, near the King farm, have two wells in the process of drilling. West Hickory now has twenty pumping wells averaging ten barrels per day. Several new wells drilling.

Reynold's Turbine Water Wheel.

A clear idea of its power and principle of action cannot easily be given without reference to drawings. The cuts herewith will, however, aid in understanding the following description of the wheel:

The wheel without case, consists of a short cylinder supporting a hub for the shaft; blades nearly radial and plane, projecting from the surface upon which the water impinges; a circular disk attached to each end of the cylinder and edges of the blades, plane except the swell for the issues, confines the water, and with the cylinder and blades, forms the body of the wheel, with each wheel. The whole is well made and finished and put together ready far use, and forms one of the most compact, portable, convenient and economical water wheels ever offered to the public. It can be transported at little expense, and put into a mill and set in motion by any person of the least mechanical intelligence.

This wheel has issues both on its upper and lower side, discharging the water both up and down, which not only secures the free escape of the water, but greatly relieves the weight on the foot step. The action of the water does not, indeed, add anything to the weight on the step. The friction on it is, therefore, very light; the power is applied with the simplest gearing, and thus very little of the useful effect of the

Fig 2 exhibits the wheel taken out of the case. The cylinder around the shaft from which spring the vertical plane blades, is easily seen, and the bottom of shaft concaved for step. The artist has made the issues on these two cuts (1 and 2) larger than the proper proportion, but they are sufficiently accurate for illustration of principle.

Fig. 3 is a view of the wheel disk; both top and bottom disks being alike. The hub, arms, and cylinder are here seen; also the concave that covers the lignum-vitæ step. The bolts seen inside of cylinder are used only on large sizes.

For further information address GEORGE TALLCOT, 96 Liberty street, New York.

Fig. 1.

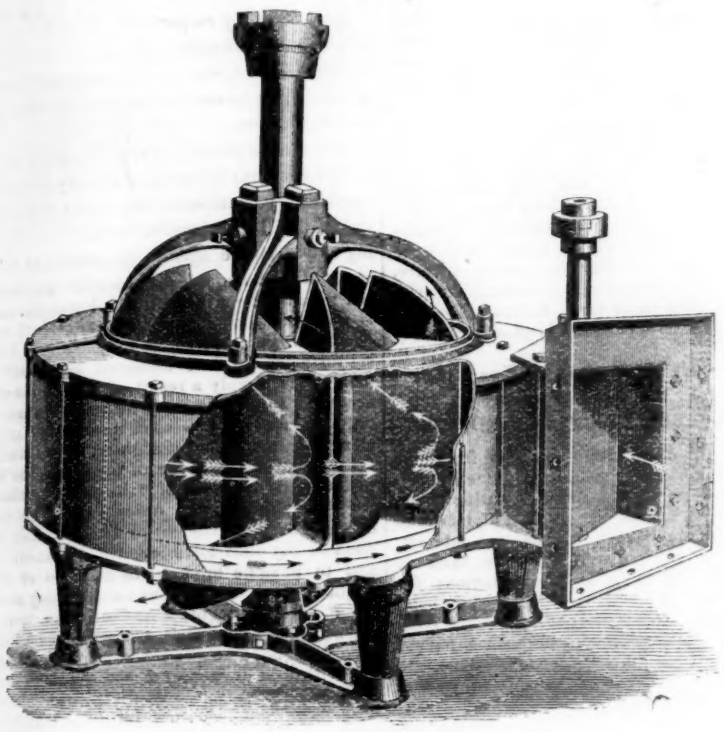
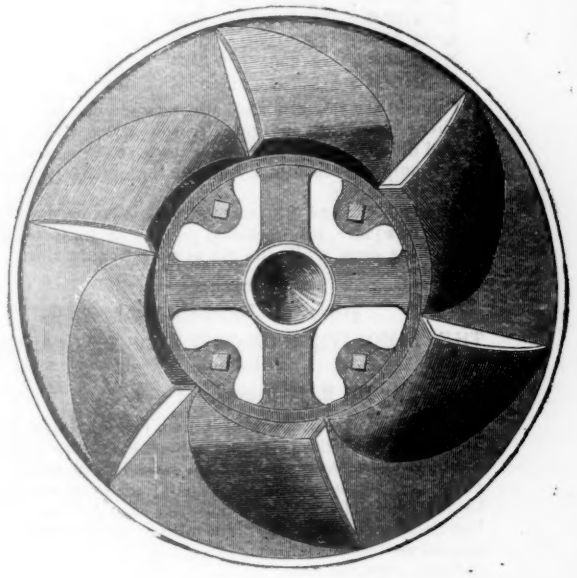


Fig. 3.



which is cast whole. The swell for the openings to discharge the water commences in the disk, on that side of the blade against which the water is directed, near the cylinder, and enlarges both in the axial and radial directions, to a point near the plane of the next blade, where it forms a curved opening, large towards the cylinder and small towards the circumference of the wheel; and which discharges the water in a direction opposite to that in which it approaches the wheel. To conform strictly to theory, neither disk nor issues should present a plane surface, but convenience, economy and strength warrant the form above described; as it gives a near approximation to the maximum effect of one made in a more perfect form, while the wheel may be cast whole, and can be made of great strength, without the aid of bolts or bench work.

In order to apply the water, this wheel is placed in a circumferential scroll case, which lays on the water tangentially and concentrically. This circumfluent application of the water allows large openings to be used, and favors a low velocity of the issuing water, as the centrifugal force holds the water to its work and retards the discharge.

By a proper adjustment of the spout, issues, scroll and motion of the wheel, the water reaches "the wheel without shock, and leaves it without motion," as nearly as is consistent with a free flow of water.

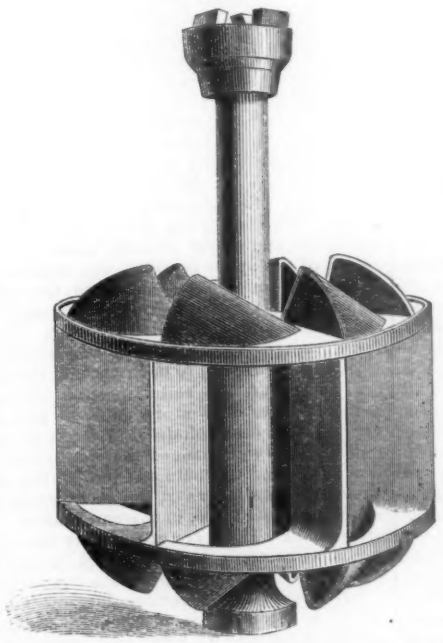
The water leaves this Turbine with a velocity nearly equal to the velocity of the wheel at the point of discharge, advantage being taken of the centrifugal force to increase the velocity of the discharge towards the circumference, as much as the velocity of the wheel is greater at the same point. At the same time the volume of discharge at each point may be equalized, by a proper adaptation of the form of the issue.

The motion af the wheel is slow and steady; an increase of the velocity reduces the quantity of water, and a decrease of velocity increases the quantity, giving the wheel self regulating capacity.

It excels all other wheels in simplicity, strength and durability; and while presenting no points upon which obstructions can lodge, it yields a very high per cent. of effect.

It is placed and neatly fitted in an iron scroll case, with iron spout and gate. The case is supported by an iron frame, fitted with an adjustable step. The step, one length of shaft, coupling and gate are furnished

Fig. 2.



water is lost by friction. This Turbine, with the ordinary finish, utilizes from 80 to 90 per cent. of the power of the water, according to circumstances. Numerous and careful experiment have been made to ascertain and determine both the quantity of water it will use and the power it will give. Thus we are able to calculate with great accuracy the effective power of any wheel, as our tables are based on these experiments and calculations.

Fig. 1 represents a Reynolds Turbine entire, excepting a portion of the case removed to show the action of water on the blades and issues, and the final discharge both upwards and downwards, as illustrated by the arrows.

Boiling Water.

There is a popular notion that the heat of boiling water is always the same, namely, 212 deg. Fahrenheit, or 100 deg. Centigrade. This arises from the fact that in most cases water is boiled under the ordinary atmospheric pressure of fifteen pounds to the square inch. But many persons do not realize that the boiling point of a liquid depends upon the pressure to which it is subjected, and that any variation of this pressure changes the boiling point. As we rise in altitude above the sea, for instance, the hight of the atmosphere over us is diminished, and at a corresponding rate, its pressure decreases. Boiling water is not so hot on the top of a mountain as it is at its base. In Quito, for instance, some six thousand five hundred feet above the sea, the pressure of the atmosphere is only a little over ten pounds, and water boils at 194 deg. Fahrenheit. This is not hot enough for all cooking purposes; hence some kinds of food cannot be eaten boiled, in Quito, as they are in other cities.

A practical and frequent instance of the increase of boiling temperature, on the other hand, is found in steam boilers. Here the water is under a pressure of steam; and the temperature of the water rises with the pressure. The proportion of this increase is not difficult to be discovered; since the temperature of boiling water, confined in contact with steam, is *exactly that of the steam.* Superheated steam is another matter entirely, and does not enter into this dicussion, since superheated steam cannot be produced while water is present. We may even say that the water at the bottom of a boiler is hotter than the steam, since it is under the additional pressnre of the column of water itself. If the steam has a pressure of one hundred pounds, and the temperature of 388 deg. Fahrenheit, which belongs to that pressure, then the water must be at least as hot as that, to generate more steam. A sudden diminution of pressure will frequently cause an explosion, by lowering the boiling point of the water, and allowing a large quantity of fresh steam to be generated at once This is a danger acknowledged to attend the use of safety-valves; and hence the engineer wishes his safety-valve to leak under pressure, not to open suddenly a wide escape for the steam.

Chemical Repertory.--No. 28.

APRIL 16, 1870.

Editor—HENRY WURTZ.

Editorial.

ERRATUM.

While our forms of the issue of 2nd inst. were being put to press, several types fell out of the article under the caption, "Farmer's Theorem Again," in the 7th paragraph; which was not perceived until all the sheets had gone through the press. We therefore republish the entire paragraph in correct form:

The following table gives the illuminating powers of Mr. Sugg's tests corrected for sperm only, and also the the fractional power each test requires, to raise it to the standard of fourteen candles.

2.	$4.9^{1.83}$	: 13.504 ::	$5^{1.83}$	:	14	candles.
3.	$4.8^{1.47}$	: 13 190 ::	$5^{1.47}$	:	14	"
4.	$4.7^{1.85}$	: 12 502 ::	$5^{1.85}$	:	14	"
5.	$4.6^{1.86}$	: 11.996 ::	$5^{1.86}$	:	14	"
6.	$4.5^{2.52}$	: 10.737 ::	$5^{2.2}$	:	14	"

I should say the 3rd and 6th tests are not reliable, as there cannot be any good reason given why they should differ so much from other tests, as the consumption is only one-tenth of a foot less than in the preceding test of either.

The 2nd, 4th and 5th tests fall a little below the 2nd power or square, the fractional powers for these being nearly the same, while the 6th is considerably more.

[*Original Communication.*]

THE LIMONITE IRON-ORE BEDS OF STATEN ISLAND.

By Dr. R. P. STEVENS, of New York.

The knowledge of beds of brown Oxide of Iron, on Staten Island, within an hour's journey of the great commercial centre of our country, extends back as early as the first settlement of the island; such knowledge having been held by honest burghers from Amsterdam. But the knowledge of their true geological position and age, as well as of their extent and depth, has been but recently obtained.

On one of the pleasantest days of last autumn; in company with Professor C. A. SEELY; and with Professor WURTZ, the Editor of this Journal; the writer of this article paid a visit to the island, and examined all of the principal deposits of iron. Since then, as well as before, the writer has made frequent visits, to extend and confirm his observations of these deposits.

Of their topography, I may say in general terms, that they lie in three parallel ranges; one, on the south shore of the island, occupies a synclinal trough, on the summit of the ridge; this ridge being the highest land of the island, and generally known as Fog and Tode hills. Another lies on the southerly slope of a parallel range of hills, and about central north and south. The third is on low land, on the northerly slope of the island.

Their geological associations are very simple. They all lie in synclinal troughs of serpentine, or in fissures of this rock. These associations were described by MATHER in his volume of the Geological Survey of New York, and were previously described in BRUCE's Mineralogical Journal.

MATHER supposed the serpentine to bear the same relation to these beds, and to have performed the same office or work that limestone has done in relation to the ore beds of Connecticut, Vermont, Massachusetts and New York. My own view is, that the iron in all these localities has been derived from the slates lying contiguous to to the limestone. Now, as the slates of the Taconic include a magnesian belt and extend southwards, and in Dutchess, Putnam and Westchester, and also on New York island, put on the form of serpentine, there is a synchronism in all these beds—from Vermont to Staten Island.

For a long period of time the geological age of these beds was supposed to be later than the Glacial Age; that is, it was supposed that the ore was only to be found in unmodified drift. The finding of masses of this ore, and its associated rock, far to the south of these deposits, in translated drift, clearly shows that the beds were anterior to the Glacial Age. Besides, they are almost always covered over with a mantle of drift of greater or less thickness. It was the examination of these redeposited beds that led to the false conclusion, that the age of the ore was confined to the drift. Recently I have found a locality where the Cretaceous outlier of quartz pebbles rests in great force upon a deposit of brown ore, the ore lying in a trough of serpentine. Here, then, I am able to ascertain the ore to be older than the Cretaceous. Is it of Mesozoic Age? Does it belong to the Red Sandstone of New Jersey? Commercially considered, the ores of Staten Island are of great importance. They all lie near tide water, and from thence ore can be readily transported by water to furnaces on the Hudson river, or along the water communications of New Jersey and Pennsylvania.

The principal mines now worked are those of Mr. ELLINGWOOD and the RICHMOND IRON COMPANY. In both of these there are breasts of ore full twenty feet in thickness. In the middle belt of ore there are lands owned by Mr. H. C. ADAMS, where the mineral puts on a new form, and seems to undergo a metamorphism into a hydrated magnetic oxide, which is highly magnetic. Of the chemical nature of this deposit the chemists of the party can speak for themselves. This peculiar variety of ore appears in fine grain, of olive green lustre, varying to green and yellow, mixed with fragments of limonite, and often blended with it.

For the purpose of making steel by the Bessemer process, it has been tried and found to work well. Analysis of it shows 87 per cent. of peroxide of iron. Ore from the island has steadily been gaining in the good opinion of Iron Masters. Large quantities—it is estimated over 100,000 tons—have already been sold; and it is understood that larger orders than ever, have been received for the present ensuing season.

Iron was made from these ores previous to, and during, the Revolutionary war. One of the earliest mining leases of the State was taken by proprietors on one of these deposits. The history of the beds offers one of those curious episodes in mining, where ores rise and gain and lose in estimation and reputation, to be again resuscitated and made remunerative to those who work them. Also, they offer another interesting feature, viz., that although so long known to the scientific world, and lying contiguous to many large furnaces, some of the largest and richest deposits have been only recently found and developed.

R. P. STEVENS, 26 Pine Street.

NOTES ON THE ABOVE, BY THE EDITOR.

I have given to the above communication from our distinguished New York geologist, a prominent position; because, apart from its general scientific value, the subject to which it relates has become of late one of special *practical* importance to the gas interest. This is because these peculiar ores form the basis of the highly improved methods and compositions for *Gas-Purification* that are now being introduced by Messrs. ST. JOHN and CARTWRIGHT of the NEW YORK GAS-LIGHT CO. In another editorial note some further remarks will be found on this topic. I wish now to refer to one or two of the scientific points involved in Dr. STEVENS' communication.

Dr. S. asks the question whether these ores may not belong to the age of the Red Sandstone of New Jersey? If so, it follows of course that its matrice, the Serpentine, should be of this age. Now, in a paper read by me to the Geological Section of the AMERICAN ASSOCIATION at the Salem meeting last summer, entitled "Notes on the Structural Geology of Hoboken and its Vicinity," I set forth the belief, arrived at by explorations extending through several years, that the Serpentine at Hoboken, together with the trap beds which are so abundantly intercalated among the supposed Mesozoic Sandstones and shales of New Jersey, have been formed almost wholly, if not altogether, by chemical metamorphism, *in situ*, of the sandstones and shales themselves. Sections were exhibited by me on that occasion illustrating this and other views relating to the nature and origin of these rocks; and specimens shown of the upper layers of the serpentine, retaining the lamination of the sandstone from which it was formed, this structure being wholly conformable with that of the sandstones which overlie it. I am therefore fully prepared to adopt the affirmative of the question asked by Dr. S., and to maintain that the Staten Island ores (or at least the materials from which they have probably been derived by aqueous and atmospheric action) have been collateral products of the metamorphic action which changed the sandstones into serpentine and trap. (I would add that at the mines of the RICHMOND IRON COMPANY, the rocky matrice of the ore appeared to me to be, in character rather a trap than a serpentine). There are exceedingly interesting chemical considerations here involved, upon which, however, there is now neither time nor room to dwell.

In regard to the curious mineral alluded to by Dr. S., as occurring on the lands of Mr. H. C. ADAMS, I wish to say that on being first shown a sample of this material by Professor SEELY, I recognized it at once as a mineralogical novelty. Hydrated black magnetic oxides of iron are familiar to chemists as laboratory products; for example, the artificial preparations used anciently in medicine, produced by the precipitation of a ferrosoferric solution by an alkali, and called "*Ethiops martialis*;" but no natural hydrated compound of this kind has hitherto been recognized by mineralogists. I would here suggest, however, that these compounds may occur not unfrequently in bog-ores, having been regarded as *magnetite* in pulverulent form.

It is my intention, in due time, to bring this forward, in a formal way, as a new mineral species, here for the first time identified. With regard to a name for it, *hydromagnetite* obviously suggests itself, but is very objectionable, from its differing but by one letter from *hydromagnesite*. *Ethiopsite* has occurred to me but a name I should regard as preferable is *ferroso-ferrite*. More of this though hereafter. Dr. STEVENS suggests that this compound has been formed from the limonite by metamorphism. I should prefer precisely the opposite view; that is, that the limonites are products of oxidation of "ferrosoferrite" itself, this native *Ethiops martial* having been first formed by the precipitation of solutions of ferroso ferric sulphates by hydrate of magnesia, these sulphate solutions having proceeded from oxidation of pyrites. HENRY WURTZ.

CORRESPONDENCE.

Professor HENRY WURTZ:

Dear Sir; My response to Prof. WALLING was delayed by a prolonged absence at New Orleans, the Mammoth Cave, etc.; and, even after my return, by the all-absorbing interest of subjects of more directly practical tendencies.

Allow me a remark in regard to a few quotations in your REPERTORY Editorial of January 3. As my theory superficially considered may appear somewhat "materialistic," I feel compelled to observe that in recognizing only a single agency, gravitation, as the primary cause of all force, which I consider inseparably associated with matter; I can only look upon the cause of this agency (so wonderfully diversified in its results and effects on the universe) in the same light I once heard set forth by our late lamented astronomer MITCHEL, namely, as simply a result of the Divine will, acting according to the necessary mathematical laws.

In regard to your second quotation of an opinion of CAZIN; on modifying it slightly, his argument becomes fully as strong in favor of my opinions as it now appears to be in favor of "the purest spiritualism." I would say thus; "In order to raise the veil which conceals from us the mysteries of creation, is it sufficient to say that force creates movement in matter, and to imagine force to be a species of entity independent from matter, and constituting motion, heat, etc.? Never ought a savant, who had painfully learned to observe what surrounds him, entertain such thought. For him the cause of heat is of the same order with that of the fall of bodies to the surface of the earth. Force, as an abstract principle, it is not the mission of the physicist to fathom. If after having become a true philosopher he aims to ascend higher into the scale of causes, he must remember the ancient warning: *Physics, beware of Metaphysics!* * * * Those who carry into this rugged enterprise notions of the latter, *are apt to arrive in their conclusions at principles identical with modern spiritualism.*"

Respectfully yours,
P. H. VAN DER WEYDE, M. D.

New York, April 12, 1870.

MASS. INSTITUTE OF TECHNOLOGY,
PHYSICAL LABORATORY, BOSTON, April 10, 1870.

Professor HENRY WURTZ:

My Dear Sir: Many thanks for the copies of your Journal, and for your note on polarization. I am glad that Mr. FARMER is still experimenting on his law; it seems well worth it.

Mr. STIMPSON, State Inspector of Gas Meters, has been making quite an elaborate investigation of sixty or seventy published series he has found, bearing on this matter, and will shortly publish a preliminary article in *Silliman's Journal*. I will ask him to send you a copy as soon as he gets his extra numbers.

Very truly yours,
EDWARD C. PICKERING.

[Prof. SILLIMAN has also written in relation to this forthcoming paper of Mr. STIMPSON (who is the skilful State Gas Inspector of Massachusetts); and Mr. FARMER, who has seen the manuscript of Mr. STIMPSON, is prepared to offer some explanations and comments. We trust we shall be kindly allowed soon to lay Mr. STIMPSON's paper before our readers, in company with Mr. FARMER's comments.—H. W.]

[*Original Communication.*]

ANSWER OF PROF. VAN DER WEYDE TO PROF. WALLING'S SECOND REJOINDER.

While I accept the apology of Prof. WALLING, as having in his first rejoinder not intended any personal reflection, I hope that the Professor may become satisfied that I, like himself, are far in advance of what is but directly perceptible to the physical senses; that I decidedly recognize something more than mere matter; that I recognize force as well as he; and that the only difference between us is, that I maintain that force ca

ot be dissociated from matter, and consequently that give a different and simpler definition of this word orce.

As Prof. WALLING again introduces his friend the iller, I may be allowed to remark in this respect, at his comparison is quite inappropriate; the theory the rotation of the earth was simply adopted be- use it was the only way to explain all the known enomena, perceived by the senses; why the miller uld not believe it, was not that he trusted only to senses, but that he was unacquainted with the ole range of phenomena; and of the observations de by the senses, which had compelled those who made a proper use, not only of all their own senses, also of the senses of the intelligent (but alas very all) portion of humanity, to adopt the terrestrial ation.

When bodies are permitted to obey the impulse of avitation, motion is the result, and force is genera- d; as soon as this or any other mass motion is inter- ted by some cause, it is changed into molecular tion, manifesting itself as heat, electricity, light, gnetism, etc. Mass motion and molecular motion refore are only different manipulations of the same mary force. In all this I believe we agree. If gravi- ion is counteracted; that is, if a body is lifted against impulse of gravitation, it can only be done by a ce, which has its own previous source in an impulse eying gravitation. Just as a lever cannot lift one ght without the descent of another weight, so the cent of millions of tons of watery vapor in the atmos- ere is caused by the previous coalescence of the mat- which now forms the body of the sun; when an nal lifts a weight, it is done by the complex action enses and muscles, deriving their force from the d, which in its turn has derived its latent force dur- its growth, also from the solar heat; the steam-en- e derives its force from the fuel in the same man- ; and we can trace every motion on our planet to same source, the falling into the sun of the primi- nebular matter, by gravitation, which also orce ed the solar heat to be generated; there is only exception to this generalization, namely, the ocean , as I have remarked on a former occasion.

Prof. WALLING, in a note, challenges me "to define ion fully and clearly if I can." His own definition ven in the text: "Motion is a continued change of ition." I suggest whether a change of position of a le body placed in infinite space, would not be practi- y equivalent to rest; and would therefore rather say: ion is a change of position of one body in regard to or more other bodies; or, to be more general (in er to include those modes of motion we call heat. tricity, etc.), the motion is a change of position of ter or molecules of matter in regard to other matter other molecules of matter.

That I also say, with Prof. WALLING, that motion of ter must have a cause, is evident from the above. primary cause being gravitation, inseparably asso- ed with matter; Prof. WALLING's cause being a e filling the whole universe, naturally dissociated m matter, but which occasionally become associated h it, and occasionally not; in the first case it mani- s itself as gravitation or otherwise; in the second e it does not manifest itself at all, but still exists, cting in every direction, and thus according to the of the composition of forces, its resultant will be o." Paired atoms "intercept a portion of the force consequently have a mutual tendency towards each er; this is the whole principle of gravitation." The fessor goes on to say: "If this theory has been ad- ced by any one previously to myself, I will thank Doctor to indicate when and where.

I am happy to earn the thanks of Prof. WALLING in ing that Prof. NORTON of New Haven also claims same hypothesis of *a single force of repulsion ex- ed by every primary atom upon every other atom, and interception of this force by matter*, to be his, as pub- ed in *Silliman's Journal* 1864-66, and republished he London *Philosophical Magazine* (see *Silliman's rnal*, January, 1870); to this I can however add neither to Profs. NORTON nor WALLING does the pri- y belong, as already an extensive philosophical ory, of which the above identical idea was a por- , was propounded by AZAIS, in Paris, in the begin- g of this century; he gave a course of lectures de- ing it, which was published in four large volumes tavo, under the title *Cour de Philosophie*. Accord- to it, the cause of gravitation on our earth is oppo- repulsive forces, acting from the stars downward; e radiating forces being intercepted by the atoms atter, which thus are not attracted towards one her, but pushed by repulsion from the outside to- ds one another; in the case of our earth bodies are attracted by the mass of the earth, but pushed n by repulsion from the stars above, the upward ulsion of the antipodal stars being intercepted by mass of the earth. It appears to me that this is tical with Prof. WALLING's ideas; but after all ing is gained by substituting a hypothesis of uni- al repulsion for one of universal attraction; it is ly the difference between a push and a pull.

[*To be continued in our next.*]

The following paper was read at the meeting of the New York LYCEUM OF NATURAL HISTORY of April 11th. The Editor wished to offer some comments, but the paper was received at too late an hour.

DISCOVERY OF HYDROGENIUM-AMALGAM.

By OSCAR LOEW,

Chemical Assistant in the College of New York.

When zinc-amalgam is shaken with water a slow decomposition of the latter takes place, which can be recognized by the formation of flocculi of hydrated oxyd of zinc, and by small bubbles of hydrogen which escape, after the mixture stands for a time.

The decomposition of water by zinc is intensified when a small amount of bichloride of platinum is added, in which case a spongy body is formed on the surface of the zinc-amalgam. This body I have found to be an alloy of hydrogenium and mercury. Hydrochloric acid does not act in a way similar to bichloride of platinum.

To obtain the hydrogenium amalgam on a larger scale, you shake thoroughly, with refrigeration, a zinc-amalgam containing one to three per cent. of zinc with a solution of bichloride of platinum, containing about ten per cent. of the latter. After the mixture has been well shaken, it is thrown into moderately diluted hydrochloric acid, when the excess of zinc as well as the oxyd and oxychloride of zinc will be dissolved, and a mixture of mercury and hydrogenium-amalgam will be obtained which can be easily separated mechanically. Without the treatment with hydrochloric acid, the product will be soon decomposed, with great expansion and evolution of hydrogen gas.

The body thus obtained has the consistency and appearance of the ammonium-amalgam, and slowly develops hydrogen under water, as well as in the dry state; by which decomposition the volume will be found to have considerably increased. On heating it in a vessel containing air, it swells up and water is directly formed, the hydrogenium combining directly with the oxygen of the air. The marked reducing power of hydrogenium found by GRAHAM in the palladium-hydrogen alloy may be observed here also. Ferridcyanide becomes ferrocyanide; perchloride of iron becomes protochloride. It has been a supposition of several chemists that the so called amonium-amalgam may be hydrogen-amalgam mixed with absorbed ammonia, and I found indeed, that ammonia is taken up by hydrogenium amalgam to a certain extent; but the behaviour towards acids, and the investigations of LANDOLT and of our American chemist, Dr. GALLATIN, have shown the existence of true ammonium-amalgam; so that these bodies are certainly not identical.

Under certain conditions the hydrogenium in its amalgam takes up rapidly the oxygen from the air, the temperature rising considerably, while water is formed. If you shake zinc-amalgam of four to five per cent. zinc (previously warmed, to liquefy the crystallized portion), with an equal bulk of bichloride of platinum solution, of 10 per cent., keeping well cooled while shaking, then expose to the air, after pressing gently between sheets of filter paper in a layer not too thin, the said phenomenon will appear after a few minutes. Here, it is the finely divided platinum, which condenses the oxygen and makes it act upon the hydrogenium in the amalgam.

The platinum, after perfect amalgamation, does not act so energetically in the nascent state. When platinum-amalgam is shaken with zinc-amalgam and water, the decomposition of water by the zinc is extremely slow, and the hydrogenium-amalgam will not be observed for some time.

Under certain conditions the hydrogenium-amalgam is formed without the aid of chloride of platinum. As I once had about 20 lbs of mercury containing some zinc, standing in a bottle with water for three weeks, the hydrogenium-amalgam was formed on the surface of the mercury, renewing itself from below, and decomposing above.

GRAHAM compares hydrogenium with the active modification of oxygen (ozone), and indeed there is much analogy. We can also accept three modifications of hydrogen, namely, the nascent hydrogen, common hydrogen, and hydrogenium. The nascent hydrogen obtained from sodium-amalgam and water, or by zinc and HCl, or by the electric current, does not combine with mercury; therefore a distinction appears proper between common nascent hydrogen and hydrogenium, which may be thus illustrated:

Antozone.	Oxygen.	Ozone.
O	[OO]	([OO]O]
Nascent Hydrogen. (*Alpha.*) *Hydrogen.*	Common Gaseous Hydrogen. (*Beta.*) *Hydrogen.*	Hydrogenium. (*Gamma.*) *Hydrogen.*
H	[HH]	([HH]H]

CHEMICAL EXCERPTA.

Chemical Society of Paris.—At the Session of Dec. 2, 1869, M. GAUTIER announced the following extraordinary and unexpected facts. A mixture of two volumes of hydrogen and one volume of oxygen, at a temperature of "nascent redness" combines slowly without explosion. At higher temperatures, short of that of a Bunsen's burner, they combine more rapidly, *yet without explosion*. Carbonic oxide also unites with oxygen already at a dark red heat, with slowness. Chlorine and hydrogen mixed, in tubes absolutely opaque, commence already to give muriatic acid at 190° C. (374° F). At 200° C. their union is quite rapid.

At the same session, M. THIERCELIN, commenting on the various methods of preserving meat, made the suggestive remark that this sort of investigation has become almost superfluous, seeing that the transportation of the living animal, even from America to Europe, is now effected successfully on an immense scale.

At the session of December 16, 1869, M DEHERAIN announced results of remarkable researches on the migrations of the immediate principles of plants and their accumulation in the seeds. The formation of glucose in plants precedes that of starch. The evaporation of water from leaves, which is the primary cause of the migrations of the proximate principles, is due to altogether other causes than mere humidity of surface; it continues even in an atmosphere saturated with moisture. *Sunlight* stimulates greatly this evaporation, which ceases altogether in the dark. In this case it is not heat that comes into play, because the calorific rays may be screened without diminishing the stimulating action. The evaporation is greatest in yellow light, while in violet light it is null.

Incautious Use of Boiler Compositions.

Many a time and oft have we cautioned steam users against the indescriminate use of boiler compositions. Often, too, have we pointed out the folly of following the dangerous advice so frequently given, that when compositions are used blowing out should be discontinued. Such a course is simply suicidal, as far as the boiler is concerned, as has just been exemplified in a case investigated by Mr. L. E. Fletcher for the Manchester Steam Users' Association. The suicidal policy may, however, extend to the owner of the attendant. The case in question occurred to a first class boiler of the Lancashire type, in which the two furnace tubes were strengthened at each of the ring seams of rivits from one end of the boiler to the other with T-iron hoops. One morning, as the fireman was about to charge his fires—the steam at the time being at a pressure of 56 lbs. per square inch—he noticed that both furnace crowns were bulging down at a little on one side of the center line, though, on looking at his water gauge, he found that he had a depth of between eight or nine inch of water over the furnace crowns. The engineer also tested the glass water gauge, and found it as just stated, but, on account of the condition of the furnace crowns, he had the fires at once withdrawn and the steam blown off. It appears that an anti-incrustation composition was used in this boiler, and that the patentee of the composition had given directions that the boiler should not be blown out until cleaning time. Therefore it has been worked on, all bottled up, for three hundred and forty hours. The water with which the boiler was fed was drawn from the river, and left a sludgy deposit. This, combining with the composition—which was of a glutinous character—formed, in the absence of blowing out, a coating on the furnace crowns of about an inch thick, and hence their distortion. It was fortunate that the engineer in charge detected this in time, or rupture might very shortly have ensued. We therefore once more point out to our readers the necessity of disregarding such absurd recommendations as those sometimes given with boiler compositions to cease blowing out. To cease to blow out will in all probability be to commence to blow up; therefore of two evils there can be no question as to which is the less—having to blow-out or having a blow-up.—*Mechanics' Magazine.*

To Prevent the Escape of Gas from India-Rubber Tubing.—India-rubber tubing is slightly permeable to gas. The amount which escapes through the walls of the tube is, however, very small; it may be advisable sometimes to render an escape impossible. This can be done by giving the tubing a thin coating of a varnish made by dissolving one part and a half of treacle and two parts of gum arabic in seven parts of white wine and three and a half parts of strong alcohol. The treacle and gum must first be dissolved in the beer or wine, and the alcohol must be added very slowly, constantly stirring the mixture, or the gum will be thrown down.

Correspondence.

[Correspondents in all cases should sign their communications with their names and address in full, not necessarily for publication, but as a guarantee of good faith.—EDS.]

Seeking for Information.

SPRINGFIELD, MASS., April 1, 1870.

Messrs. Editors: I noticed in the last number (16th March, page 80) of the GAS-LIGHT JOURNAL, under the heading "Some Things as Well as Others," in the paragraph commencing "Second," some remarks on the illuminating power of gas dependent on temperature. It is there stated, that if we take 65° F. as the standard of 100 parts, the illuminating power at 36° is only 83 parts, or about one third; and that increased heat is not followed by a corresponding increase of light.

Now the inquiry which I wish to make is this. At what degree of Fahrenheit will gas give its maximum light? This seems to us a very important inquiry in practice. If, for example, a gas burner must be heated to *a certain degree*, in order that it may give the most light, it is certainly important for us to know when that degree of heat is. Can you tell us what that degree of heat is, which is requisite to secure the greatest, or maximum light?

In the foregoing inquiry we mean, of course, the heating of the burner or gas, *before ignition*, and not afterwards. Or, if the temperature of the surrounding atmosphere is in question, we mean the heating of this *before the ignition* of the gas.

If this inquiry shall seem to you worthy of an answer, it would be very gratifying to many of your readers in our acquaintance, to read your reply.

We would like to hear your opinion of the "Poor Richards Gas Catechism," sent you by the author.

Permit us here to say that the series of articles in your Journal, some time ago, entitled, "Facts About Gas for the People," were read with great interest; and that many of your readers would like to have them appear again in the Journal. Yours respectfully,

AVERY & Co.

[The item you refer to was founded on an article that has been going the rounds of the scientific newspapers, which we assumed to come from good authority, though on reexamination we are by no means well satisfied of its reliability. To enable you to form your own judgmant we annex the whole article hereto:

INFLUENCE OF TEMPERATURE ON THE LUMINOSITY OF STREET GAS.

That temperature exerts an appreciable influence on the luminosity of street gas must be known to every body who has watched the street gas lamps in a cold winter night. The decrease in the lighting power in this case is probably due exclusively to condensation of some of the hydrocarbons of the gas. A Vogel, of Munich, has recently examined this subject, using for this purpose a tube in the form of a U, which he placed in a freezing mixture, and through which he conveyed the gas. Photometric determinations, undertaken on various days, gave as an average the following results:

Degrees, Fah.	Illuminating Power. I.	II.
At 64.4	100	100
At 32.	76	85
At 4.	33	40

From this it is seen that the influence of the temperature on the illuminating power of the gas is very considerable. The above numbers, however, are more of a scientific than a practical value, as it is not likely that even during the coldest terms the gas reaches a point as low as two of the above communicated ones.

In order to be able to determine the influence of higher temperatures, the U tube was first placed in a vessel filled with boiling water, and subsequently in one containing melted paraffine, the temperature of which did not exceed 320° Fah. Photometric measurements yielded the following results:

Degrees, Fah.	Illuminating Power.
At 64.4	100
At 212.	104
At 320.	118

This shows that the influence of high temperatures is less than that of low ones.—*Manufacturer and Builder, August*, 1869.

The City of Panama is rapidly carrying on the work of introducing gas for lighting the streets. The pipes are all laid, and the lamp posts all erected, and the retorts will be ready in a few weeks.

Recent American Patents.

Pertaining to Gas, Water, Etc., from the 2nd to the 9th April, 1870.

100,964.—Water Meter.—A. W. Almqvist and F. W. Ofeldt, New York city.

100,983.—Steam Generator.—Orlando Clarke, Rockford, Ill.

101,012.—Process and Apparatus for Treating Wood. Ira Hayford, Boston, Mass.

101,035.—Apparatus for Purifying Water for the Manufacture of Ice.—T. F. Peterson, New Orleans, La.

101,040.—Water Wheel.—W. L. Selleck, Wilwaukie, Wisconsin.

101,059.—Water Meter.—Thomas Sweeney, Boston, Mass.

101,066.—Attachment for Lamp Burners.—William Westlake, Chicago, Ill.

101,073.—Lamp Burner.—D. P. Wright and Cephas Butler, Birmingham, Eng.

101,079.—Vapor Burner.—Wm. Aurich, Chicago, Ill.

101,084.—Turbine Water Wheel.—William Bailey and A. B. Crowell, Baltimore, Md.

101,168.—System of Heating and Ventilating.—G. F. Schulze, Janesville, Wis.

101,171.—Electro Hydrocarbon Gas Machine.—H. Julius Smith, Boston, Mass.

101,192.—Fluid Lamp.—Thos. Ward, Columbus, Ohio.

101,199.—Water Wheel.—A. N. Wolf, Sheridan, and Joel Hang, Bernville, Pa.

101,202.—Vapor Burner.—Albert F. Zeigler, Columbus, Ohio.

101,215.—Vapor Burner.—David Berkey, Huntington, Indiana.

101,221.—Turbine Water Wheel.—Clark Boyd, Andover, New York.

101,223.—Hot-Blast Furnace—A. Burtenshaw, Hope Furnace, Ohio.

101,225.—Steam Boiler Feeder.—J. M. Case, Worthington, Ohio.

101,233.—Steam Generator.—Hugh E. Curry, Louisville, Ky.

101,248.—Preventing the Incrustation of Steam Boilers.—J. T. Fisher (assignor to James B. Clow), Pittsburg, Pa.

101,255.—Water Wheel.—James E. Gillespie and H. B. Weaver, Hartford, Conn.

101,261.—Pump.—E. C. Hammond, Oswego, N. Y.

101,282.—Current Water Wheel.—William Lightfoot, Hamilton county, Tenn., administrator of John S. Lightfoot, deceased.

101,304.—Pump.—M. S. Orton (assignor to Zimri Pond), Galesburg, Ill.

101,306.—Rotary Hydro-Pneumatic Pump.—Henry M. Paine, Newark, N. J. Antedated Feb. 23, 1870.

101,323.—Water Meter.—George W. Smith, Norwich, Conn.

101,325.—Lubricating Compound.—Jacob H. Smyser, Pittsburgh, Pa.

101,334.—Steam Water Elevator.—J. C. Wightman, Newton, assignor to T. P. Proctor, trustee, West Roxbury, Mass

101,347.—Water and Gas Meter.—N. L. Blanchard, Sputen Duyvil, N. Y. Antedated March 24, 1870.

101,348.—Exhausting Apparatus for Gas Works.—S. R. Brick, Philadelphia, Pa.

101,464.—Still for Hydrocarbons.—S. A. Hill and C. F. Thumm, Oil City, assignors to themselves and Oliver P. Scaife, Pittsburgh, Pa. Antedated January 2, 1870.

191,369.—Extension Gas Fixture.—Henry Kruger, New York city.

101,378.—Turbine Water Wheel.—J. B. Park, North Platte, Nebraska.

101,402.—Water Wheel.—Pierce W. Yarrell, Littleton, N. C.

REISSUES.

3,885.—Operating Slide Valves in Direct-Acting Engines.—W. H. Guild and W. F. Garrison, Brooklyn, E. D., New York, assignees of G. W. Hubbard and W. E. Conant. Patent No. 12,203, dated January 9, 1855; reissue 2,359, dated September 18, 1866: extended seven years.

3,888.—Pump.—The Forrester Manufacturing Company, Bridgeport, Conn., assignee by mesne assignments, of I. N. Forrester and J. H. Luddington. Patent No. 85,577, dated January 5, 1860.

3,892.—Apparatus for Carburetting Air and Gas.—Arthur Barbarin, New Orleans, La. Patent No. 95,412, dated October 5, 1869.

3,899.—Pump Piston.—New England Pump Manufacturing Company, Boston, Mass., Pacific Pump Manufacturing Company, San Francisco, Cal., Charles F. Mudge, Bridgeport, and Bridgeport Manufacturing Company, Bridgeport, Conn., assignees, by mesne assignments, of Nathan Stedman. Patent No. 41,543, dated Feb. 9, 1864.

MISCELLANEA.

The "Eau de Nil," a new color, has been produced in Paris. It is a delicate mixture of gray and green shot with silver, which is said at every movement of the body to give to the robe "the aspect of flowing water."

F. E. Stimson, State Inspector of Gas Meters, in his annual report to the Massachusetts Legislature, states that he had inspected 11,814 meters during the year; 7589 new, 4121 old or repaired, and 104 offered for reinspection. Of these 11,511 were sealed, 4926 of which registered an average of one and two-tenths per cent. against the company, 3138 registered an average of one and eight hundredths per cent. against the consumer, and 3447 were quite correct. The extreme of incorrect registry allowed is two per cent. Only 303 were rejected. One of these registered more than 26 per cent. against the consumer.

Death in the Water Pipes.—Prof. C. F. Chandler, Chemist to the Board of Health, has recently been analyzing water which had passed through lead pipes. He ascertained that one gallon of Croton water which had remained several weeks in a lead lined cistern contained 6.100 grains of lead; that a gallon of water which had been in the lead pipes of his own house six hours, contained 11.100 grains; that water drawn from hydrants after passing through about 150 feet of lead piping also showed traces of lead. Servants are recommended to run the water off a short time before using, and especially to resort to this precaution early in the morning.

Hamilton Gas Company.—The twentieth annual meeting of the above company was held in Hamilton (C. W.) recently. After the reading and adoption of the annual report, votes of thanks were passed to the retiring directors, and to the manager, for his services during the past year. The following gentlemen were appointed directors for the ensuing year: Messrs. John Young, E. C. Thomas, Y. W. Gates, T. C. Kerr, Edward Sweetman, James Russell, James Cummings.

SITUATION WANTED.—A GAS ENGINEER of nearly twenty years experience in Building and Managing Works, is now open for an engagement. Undoubted reference furnished as to ability and moral character. Address, ENGINEER, office of thif Journal, or Box 1513, New York P. F.

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The Experience of FIFTY-SEVEN Years attests the Quality of our

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IMPORTER AND DEALER IN

PICTOU, SYDNEY LINGAN, NEWCASTLE, CANNEL AND WELSH COALS.

Agent for the New England States, for the sale of the

Delaware, Lackawana, and Western Railroad Company's Scranton Coal.
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No. 137 Front Streat, New York.
2 -1

THE NEWBURGH
ORREL COAL COMPANY,

Mines at Newburgh, Preston County, West Va.
Company's Office, No. 52 S. Gay street, Baltimore, Md.
C. OLIVER O'DONNELL Pres't. G. W. MAHOOL, Sec'y.
CHAS. W. HAYS, Agent in New York, Room 7, Trinity Building, 111 Broadway.
W. D. CRANE & Co., 26 Kilby street, Boston.
This Company offer their very superior Gas Coal at lowest market prices.
It yields 10,926 cubic feet of gas to the ton of 2,240 lbs., of good illuminating power, and of remarkable purity; one bushel of lime purifying 6,792 cubic feet, with a large amount of coke of good quality.
It has been for many years very extensively used by various Gas Companies in the United States, and we beg to refer to the Manhattan, Metropolitan, and New York Gas Light Companies of New York; the Brooklyn and Citizens' Gas Light Companies of Brooklyn, N. Y.; the Baltimore Gas Light Company of Baltimore, Md., and Providence Gas Light Company, Providence, R. I
The best dry coals shipped, and the promptest attention give to orders. 224-1

THE DESPARD COAL COMPANY

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DESPARD COAL

To Gas Light Companies throughout the country.

Agents, PARMELEE BROTHERS, No. 32 Pine street, N. Y.
BANGS & HORTON, No. 31 Duane street, Boston.

Mines in Harrison County, West Virginia.
Wharves, Locust Point, / Company's Office, 29 South street, } Baltimore.

Among the consumers of Despard Coal, we name: Manhattan Gas Light Company, New York; Metropolitan Gas Light Company, New York; Jersey City Gas Light Company, N. J.; Washington Gas Light Company; Portland Gas Light Company, Maine.

*** Reference to them is requested. 204-1y

West Fairmount Gas Coal Mines.

HENRY Y. ATTRILL, Proprietor.

Mines at Fairmount, Marion Co., West Va.

Oliver Jackson, Esq., Pres. First National Bank of Fairmount, Manager.

Wharves, Hankey's Locust Point, / Office, 35 S. Gay-street, } Baltimore, Md.

I offer this superior coal to Gas Companies throughout the United States—SUPERIOR TO ANY. See analysis by Engineer Manhattan Gas Light Company of New York in the "Gas-Light Journal" vol. X, No. 218, p. 217. Orders solicited from Gas Companies, Gas Manufacturers, and shippers of Coal by the cargo.

This coal, by analysis of Jos. A. Sabbaton, gave a yield of 9,681 cubic feet, and 9,500 cubic feet to the ton with an ILLUMINATING POWER OF 19.50 CANDLES, AND 40 BUSHELS COKE. 215-3m

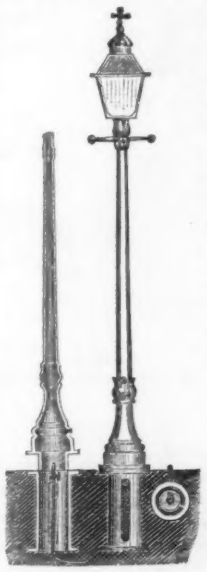
FAIRMONT GAS COAL COMPANY OF NEW YORK.

Mines at Fairmont, Marion County, West Virginia.
Office, 47 Exchange Place, New York.
A. N. MEYLERT, President. HIRAM BENNER, Sec'y and Treas.

THIS COAL IS OF VERY SUPERIOR QUALITY, with an illuminating power of 19 candles, yielding over 10,000 cubic feet of gas to the ton, and an excellent coke.
The orders of Gas Companies solicited. 233-tf.

BRANSON'S PATENT LAMP POST

THE ADVANTAGES OF THIS PATENT POST over the old style, are as follows:



1st. The saving of the base or bottom part of the Post, when the column is broken, the Post being made in two parts. The broken column can be replaced by a new one, without disturbing the base.

2d. When the old style of post is broken, the bottom piece has to be dug out, which cannot be done in winter, or in wet weather: all this is obviated in this Post, as no digging is required. This style of Pos is especially desirable when flag stone sidewalks are used.

3rd. When a stoppage of gas in stand pipe occurs, the column can be lifted out, the pipe detached, cleaned, and replaced in fifteen minutes; no digging being required as is now done with the old Post.

4th. A lighter and better casting can be made from this patent, and it can be handled better, owing to its length and lightness.

5th. In case a broken column cannot be repaired, one third of the original cost is saved by the base being secured and perfect.

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Certificate.

ST. LOUIS, September 1, 1869.

I have examined a new Lamp Post, the Branson patent, and unhesitatingly pronounce it to be the best thing of the kind I have ever seen. Posts of this description have been erected in this city, and in my opinion this style of Post should be universally adopted, as I believe it possesses all the advantages claimed for it.

The St. Louis Gas-Light Company have adapted this Post and ordered a large quantity for immediate use.

THOMAS PRATT,
537-6m Sup. st. Louis Gas Works.

THE FAIRMONT GAS COAL CO. OF NEW YORK.

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Mines at Fairmont, Marion Co., W. Virginia.

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The Coal from their Mines is remarkably free from sulphur.

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Refer to the Manhattan Gas-Light Company, New York, and the New York Gas-Light Company, New York.

HIRAM BENNER, Sec. and Treasurer. A. N. MEYLERT, President.
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Patent Gas Works,

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Consulting Chemist,
Geologist and General Scientist,
PROFESSOR HENRY WURTZ.

[NOTE BY PROFESSOR WURTZ.—Contributions and items for which I am, as a Scientist, individually responsible, will have attached my full name or initials.—H. W.]

SATURDAY, APRIL 16, 1869.

WISHING TO MAKE this Journal an organ of intelligent discussion to those of our readers who may wish to gain or give information on the subjects to which its columns are devoted, the publishers solicit letters from all among them who make the study of those subjects a pleasure, or a profession.

Subscribers would confer a favor upon us by remitting *CHECKS* or *POST OFFICE MONEY ORDERS*, as we are frequent losers where money is enclosed in letters.

☞ NEWS AGENCY.—The American News Company, 119 and 121 Nassau street, New York, are agents for this Journal. News-dealers will please send orders to them.

NOTICE.

☞ *All Collections for Advertisements, Subscriptions, etc., are made directly from this Office. We have Agents to solicit the same, but they are not authorized to Receipt for Money.*

TO OUR SUBSCRIBERS AND PATRONS.

In making remittances for subscriptions, always procure a draft on New York, or a POST OFFICE MONEY ORDER, if possible. Where neither of these can be procured, send the money, but always in a REGISTERED LETTER. The registration fee has been reduced to fifteen cents, and the registration system has been found by the postal authorities to be virtually an absolute protection against losses by mail. ALL Postmasters are obliged to register letters whenever requested to do so.

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Owing to our Large and Constantly Increasing Business, and Especially the Patent Agency Department, we have been obliged to obtain Larger and More Commodious Apartments at

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WYCKOFF'S WOODEN GAS AND WATER PIPE, ETC.

We have recently, while on a visit at Elmira, New York, been much interested in examining the machinery, and the manner of manufacturing wooden piping for gas and water, and other purposes.

At another time we shall give a full description of the process, only remarking here, *en passant*, that this pipe is made from simply pine or other timber, of proper diameter and lengths, which by peculiar hollow augers, of different sizes, is cut or bored out in concentric tubes or pipes, only leaving at last a small core, a little less than the bore of the smallest pipe. In this way a piece of timber, originally ten inches in diameter, will *turn out*, several pipes of, say 10, 8, 6, 4, 3 inches in outer diameter, and about 1½ inches in thickness, or of greater thickness, if required, by decreasing the sizes of the inner tubes proportionately. The hollow augur cuts away only from one half to three quarters of an inch. This piping is then properly strengthened by iron bands, and subjected to a bath of asphaltum or other cement to make it impervious to gas or water, and to prevent decay. This piping is cheap and serviceable, and we understand is becoming quite popular, especially at the West.

Messrs. Wyckoff, Brothers & Co., who originally established the business, have recently sold out their patents and business to Messrs. I. S. Hobbie & Son, who will carry on the business with their well known capacity, energy, and tact. Their advertisement will be found in another column.

NOTE ON GAS PURIFICATION.

An unmistakeable revolution is now pending in this country in the selection of coals for the general supply of our Gas Works. Until within a year or two the opinion has been generally prevalent with us that a most important element in estimating the relative value of a gas-coal must be its comparative *freedom from sulphur*. Even the yield of gas, as regards both the quantity and quality, has been often maintained to be practically secondary to the questions as to how much lime and how much time will be required to meet the lead-paper test on a given daily make of gas. Hence many of our American gas-coals, exceedingly abundant in many of our mining districts, and yielding large volumes of gas of high illuminating power, have been long held in disesteem by our gas-engineers and superintendents, and immense sums of money expended accordingly in the importation of expensive foreign coals. Among these American coals, may be classed, for example, the rich but highly sulphurous gas-coals of the Monongahela Valley, in West Virginia, as about Clarksburg.

The Chemical Editor of this Journal, who writes this, has himself, until within less than a year past, shared in these views; and admits frankly that he has been forced, by the impregnable logic of events and of experience, to abandon strongly-grounded prejudices on this subject.

It is altogether to the persistence and energy of two gentlemen of this city, attached to the NEW YORK GAS-LIGHT CO., Messrs. ST. JOHN and CARTWRIGHT, that we owe the initiation of this new and important chapter in the history of our gas manufactures. In another column of this issue is given an article on the Iron Ore-Beds of Staten Island. The gentlemen above named have been engaged for two or three years in experimenting on the material of these ore-beds as a basis of a composition for purifying gas, and have succeeded in so preparing it, and so combining it with some other cheap materials, as to produce a composition which, when operated and manipulated by their methods, has a wonderful power to absorb the sulphur from the impure gas. [To make intellgible to chemists the reason of the eminent fitness of this peculiar ore (the use of which for this object has been patented by ST. JOHN & CARTWRIGHT) for this purpose, I will state that it is almost entirely composed of a soft amorphous crumbly *limonite*, containing some 14 per cent. of water; whereas most of our beds of native brown hematite (mistaken until lately for limonite), are now known from the investigations of Professor BRUSH to be largely composed of the harder, compacter, and less hydrated species *turgite*, which holds but 5 per cent. of water].

The purification of gas, so far as the sulphur is concerned, by means of the methods of ST. JOHN & CARTWRIGHT, has recently been brought to such a point of perfection, that an *almost incredible* saving of labor, time, and (what is frequently quite as important) *space*, is effected. The writer has just returned from a visit to the fine Works of the HARLEM GAS-LIGHT CO, where these new methods have lately been introduced; and where an examination of the facts and figures has so impressed and convinced him that no further room is left in his mind for doubt or deliberation. It is too late to insert an account of this visit, including the facts and figures alluded to, in the present issue. Such an account will appear in our next.

After what is said above, the character of the revolution in American gas manufacture, asserted in the first sentence of this note, to be pending, will be apparent. In view of the vast advance in facility and economy in the removal of sulphur from gas, which we are now enabled to achieve, through Messrs. ST. JOHN & CARTWRIGHT'S inventions, the aspect of the problem of the selection of a gas-coal is altogether changed. The great obstacle to the *exclusive* employment of our rich but sulphuretted American coals disappears, and foreign coals will pass out of use altogether. Instead of limiting the use of Despard, and similar coals, to one-third or less, of the charges, we shall charge with these altogether.

It cannot be disputed, of course, that a portion of carbonic acid is left in the gas by this, as by other iron preparations; which very likely diminishes the candle power appreciably, it may be to the extent of some ten per cent.; but it is to be remembered that the rich gas of these coals will bear this very well. For instance, the coal used now by the HARLEM CO., is exclusively the MURPHY RUN, of West Virginia, which yields a gas, when thoroughly purified by lime (an extremely difficult thing to accomplish on a large scale), of some twenty candles from a five-foot burner. I am informed on good authority that the gas now actually served out by this company may be fairly called an 18-candle gas.

Besides, let me remind my friends in gas-circles, of what has long been strictly ascertained, but seems of late to have passed out of general recollection; that a very minute change in the pattern of the burners in ordinary use will almost neutralize the detrimental effect of a small percentege of carbonic acid. Let the apertures of a burner be

slightly enlarged; or, in Argands, the flow of air through the throat be diminished, and the effect of a little carbonic acid becomes inappreciable. Diminution of the pressure nearly to the flickering or flagging point, will do the same thing; though of course not so conveniently. H. W.

THE BEEBE GAS-WELL.

THE EFFECT OF THE CARBONIC ACID PRESENT, ON THE CANDLE-POWER.

The paucity of data, of any sort, on the subject of the influence of carbonic acid gas in diminishing the illuminating power of coal-gas is most surprising. For example, the only allusion to the subject that I have been able to find in CLEGG, is contained in one sentence on page 31 (fourth edition). "One per cent. of carbonic acid diminishes the illuminating power of coal-gas to the extent of about six per cent." This general statement is probably founded on results given in a communication to the London *Journal of Gas-Lighting* (Vol. III., p. 238, October 10, 1853), by ALEXANDER WRIGHT. His experiments were not made, however, with any burner whose consumption was as great as five feet per hour, the three burners used having been a *four-foot* Argand, and two "Union jet" burners, of 2½ and 1½ feet capacity, respectively. His results were as follows: operating with these burners on "a well-purified cannel-coal gas, 2½ feet of which, consumed in a No. 2 union jet, gave 13 candles." (This is equal, for 5 feet, by Farmer's theorem, to 52 candles; though it is of course impossible to burn this amount from any Argand. Even 4 feet gives us 20.31 candles).

1. With 1.5 per cent. carbonic acid added:

Loss for 1 p. c., with Argand, 4 feet= 6.7 per ct.
" " " U'n jet, 2.5 feet= 8.6 per ct.
" " " " 1.5 feet=11.3 per ct.

2. With 4 per cent. carbonic acid added:

Loss for 1 p. c., with Argand, 4 feet = 7.25 per ct.
" " " U'n jet,2.5 feet = 9.25 per ct.
" " " " 1.5 feet =11.00 per ct.

I have been unable as yet to find any more definite or satisfactory information on this important point in the many authorities I have consulted. The recent superb and pretentious work of SCHILLING (French edition, page 68) is satisfied with the general, purely hypothetical, and certainly incorrect view that the degrading effect of carbonic acid is due to its second equivalent of combined oxygen (acting like free oxygen in atmospheric air), attributing at the same time the degradation produced by air to its oxygen alone; whereas, as Professor SILLIMAN and myself have shown (CHEM. REPERTORY, No. 12, August 16, 1869, page 52), the absorption of heat by the nitrogen of the air is far more highly detrimental. As the oxygen in carbonic acid, over and above the carbonic oxide, is equal to half its volume; and that in air is but one-fifth of its volume—according to the hypothesis adopted by SCHILLING, two volumes of carbonic acid should be equal in degrading effect to five volumes of air, or one volume of the first to 2.5 of the last. Thus, according to the exact experiments of Professor SILLIMAN and myself (as set forth in the paper in a previous issue of this Journal, cited above), the degradation due to each one volume per cent. of carbonic acid would become as great as 12 per cent., when burned from a five-foot Argand. This is not only incredible, but not in accord with the actual results of WRIGHT, as above related, with his four-foot Argand.

Upon the whole, the writer believes that, although this subject has been left as yet in a strange condition of obscurity by gas-chemists, we should be fully justified in assuming, at the least, a loss of *four per cent.* in a 15 candle gas, from a five foot Argand burner, for each one per cent. of carbonic acid added. On this assumption, if we adopt the candle-power, for a five-feet consumption, of the crude gas, as calculated in our last issue (page 104), merely by the ordinary rule, namely, 9.14 candles; 1,000 feet of this gas should give, on purification, 900 feet of gas whose value should be represented by

$$\frac{9.14 \times 100}{100-40} = 15.2 \text{ candles.}$$

In fact, it is hard to believe that the candle-power of the gas of the BEEBE Gas Well, after purification, can be less than 15 or 16 candles; equal for example, to the average of the gas served out by the MANHATTAN COMPANY, of this city. H W.

Answers to Correspondents.

A. T., of N. Y.; L. W. of Me.; and J. A. P., of Va.—Will find illustrated in this number of the Journal the article they are desirous to learn about. Its merits are apparent and positive.

S. N., of Ohio.—Propelling canal or other boats by the reactive force obtained by drawing in water at the fore part, and forcing it out at the after part of the boat is not new, nor of any practical value.

J. A. T., of Ind.—An assignment for a patent requires a five cent revenue stamp to be attached. A power of attorney requires to have a dollar stamp.

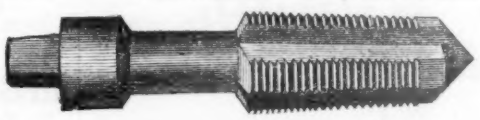
D. L.—Combustion is ordinarily the rapid chemical union of oxygen with a combustible. It may be termed oxydation. Combustion may occur, however, without the presence of oxygen. The powerful chemical combination which occurs, when powdered antimony or thin copper leaf is placed in chlorine, is attended with vivid heat and light. The result will be a chloride of antimony or copper.

J. L., of Ohio.—The best cheap metallic paint we know of for the inside of your retorts is Price's Metallic Paint, sold by Daniel Sloan & Co., 115 Liberty st. We can furnish you a formula for other ingredients, if you desire, in order to produce a good glaze.

Want of space will necessitate us to lay over several answers to correspondents, until the next issue of the Journal.

NOTICE.—WILL CHARLES GREENE, WHO had an Electrical Engine on exhibition at the late Mechanics' Institute Fair in this city, please send his address to the Editors of this Journal, and oblige.

Will CHARLES JONES of Philadelphia, who sent us a comunication a few weeks ago, about Hydrogen Gas Apparatus, please communi :ate his present address.



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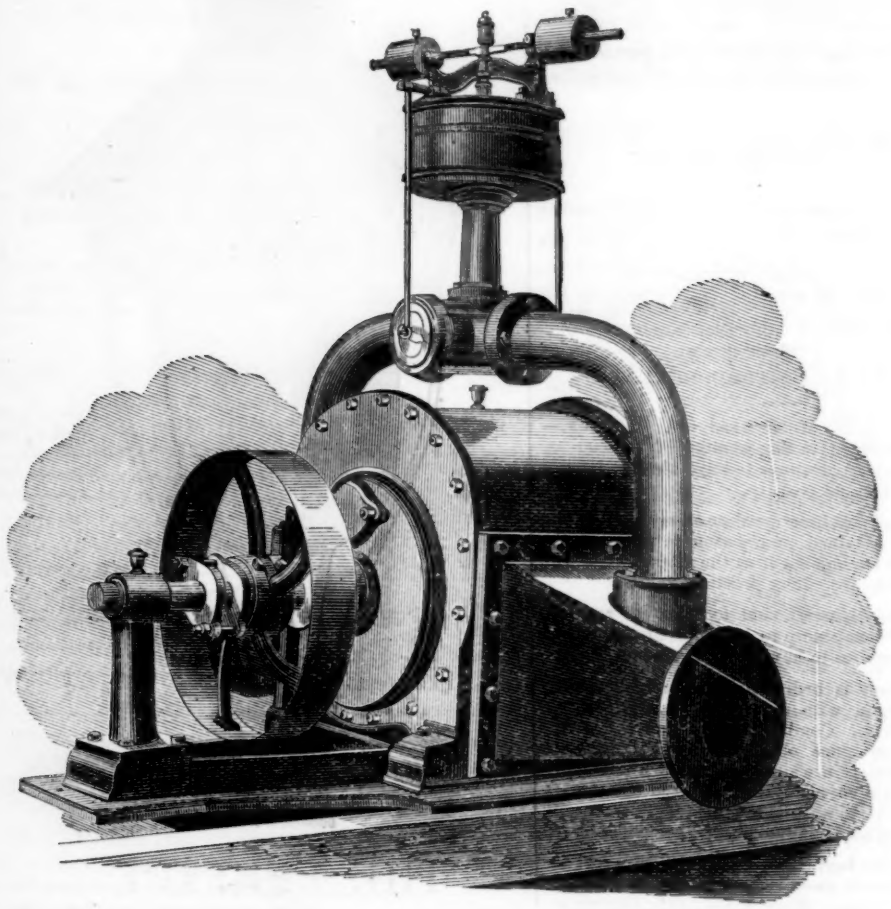

They are made to pass from 4,000 to 150,000 cubic feet of gas per hour; will increase the production and illuminating power of the gas, and add very much to the durability of the retorts, either clay or iron. The Compensator obviates entirely the necessity of water-joints, is compact, durable cleanly, not liable to get out of order, self-acting, quiet, and certain in its operation.

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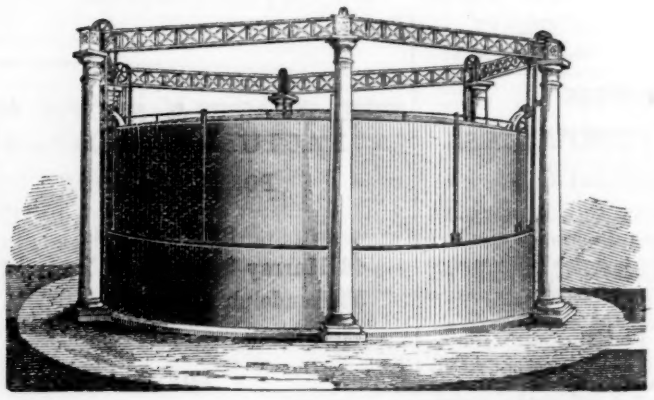

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FIG. 1.

Fig. 1 shows a single gate valve.

Fig. 2 represents wedge and one-half of gate of double valve, intended for larger sizes, when required to bear heavy pressure either side.

Fig. 3, represents a section through body, gate and wedge.

The slides, G G, are held against wedge D, by ribs, H H, projecting from sides of valve body, A.

In closing the valves, when opening I is covered, slides, G G, pass the lower ends of ribs, H H, when the wedge, D, can move forward on the inclined planes E E, and crowd the gates apart.

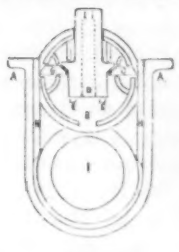

FIG. 3.

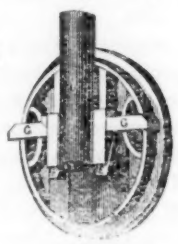

FIG. 2.

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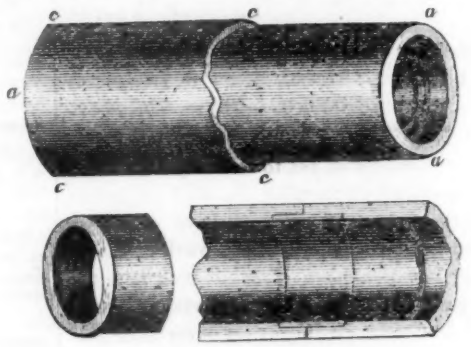

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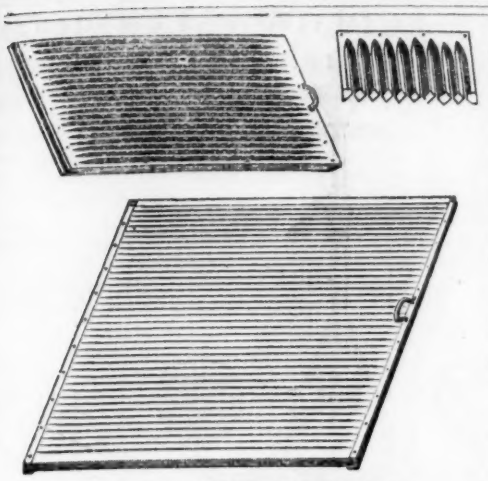

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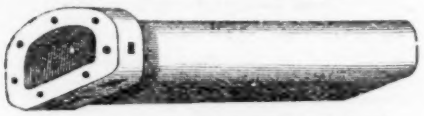

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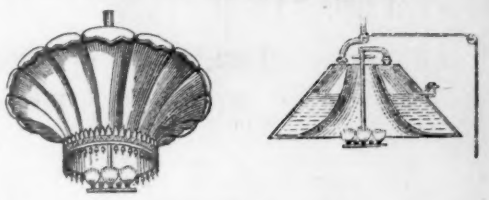

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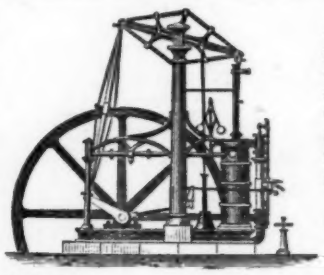

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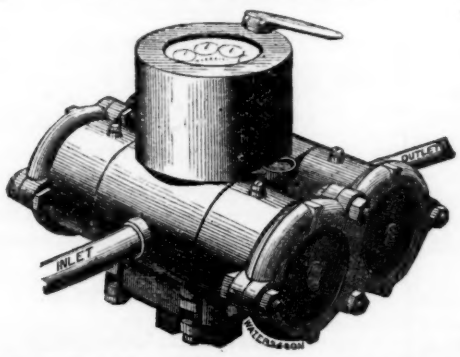

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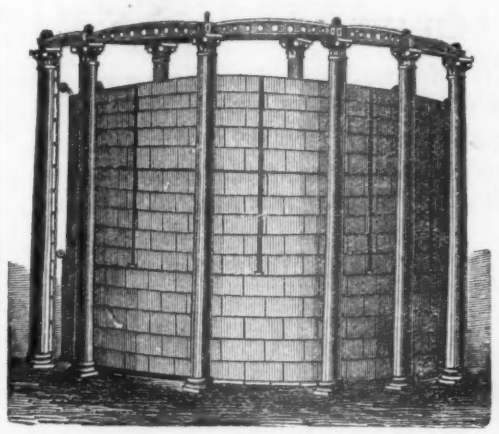

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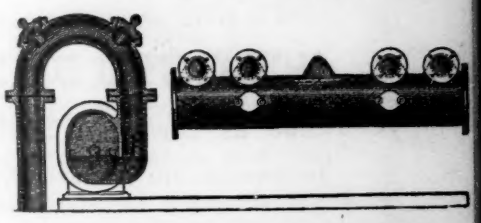

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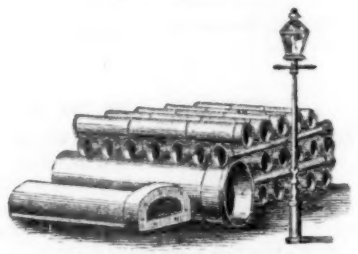

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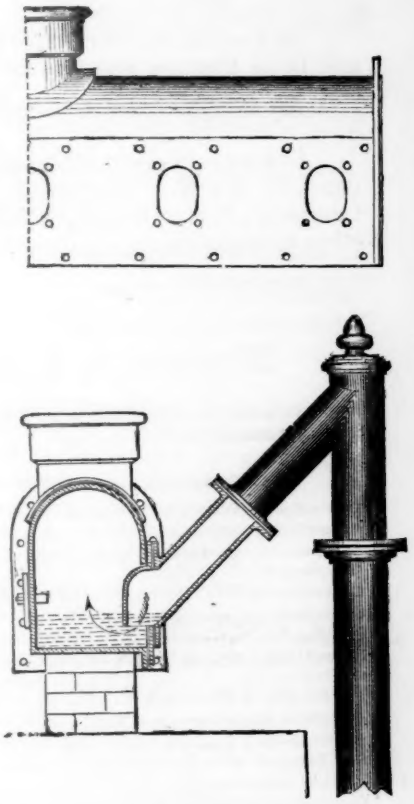

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